

**Questions and Answers:
NCI Alliance for Nanotechnology in Cancer
and Centers of Cancer Nanotechnology Excellence**

October 3, 2005

For more information about nanotechnology and the NCI Alliance for Nanotechnology in Cancer, please visit <http://nano.cancer.gov>.

For a copy of the questions and answers provided in September 2004 when the Alliance was launched, [click here](#).

1. What is the NCI Alliance for Nanotechnology in Cancer?

To capitalize on the promise of nanotechnology in cancer, the National Cancer Institute (NCI) launched the Alliance for Nanotechnology in Cancer in September 2004. The Alliance, built on a strong foundation of science and scientific accomplishment, is a comprehensive, systematized initiative encompassing the public and private sectors. The Alliance is designed to accelerate the application of nanotechnology to the major challenges in clinical oncology and basic cancer research to support the NCI Challenge Goal of eliminating suffering and death due to cancer by 2015.

2. What is the NCI's experience in cancer-related nanotechnology research and development?

For the past seven years, the NCI has taken the lead in integrating nanotechnology into biomedical research through a variety of programs. The results of these efforts have demonstrated clearly that melding nanotechnology and cancer research and development efforts will have a profound, transformative effect on how we prevent, diagnose, and treat cancer.

3. What is the structure of the NCI Alliance for Nanotechnology in Cancer?

The Alliance has four major components:

- Centers of Cancer Nanotechnology Excellence (CCNEs) will fund seven hubs over 5 years to develop and apply nanotechnology and nanoscience solutions to the diagnosis and treatment of cancer. These awards were announced on October 3, 2005. Funding for the first year of the CCNEs will total \$26.3 million. The CCNEs are a major component of the NCI's \$144.3 million 5-year initiative for nanotechnology in cancer research.

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- Cancer Nanotechnology Platform Partnerships are tightly focused programs designed to develop the technologies to underpin new products in six key programmatic areas: molecular imaging and early detection, *in vivo* imaging, reporters of efficacy (e.g., real-time assessment of treatment), multifunctional therapeutics, prevention and control, and research enablers (opening new pathways for research). These 12, 5-year R01 awards will be announced in October 2005. The first-year funding on these awards will total \$7 million.
- The Nanotechnology Characterization Laboratory (NCL), (<http://ncl.cancer.gov>), established at the NCI's Frederick, Maryland, facility in 2004, performs analytical tests to guide the research community; support regulatory decisions; and help identify and monitor environmental, health, and safety ramifications of nanotech applications. The NCL recently completed its first year of operation and is actively characterizing nanoparticles for academic and commercial researchers through a rigorous set of analytical protocols. The NCL works closely with the National Institute of Standards and Technology (NIST) and the U.S. Food and Drug Administration (FDA).
- Multidisciplinary research training and team development is a major focus of the Alliance because the application of nanotechnology to cancer challenges requires teams of scientists with knowledge and understanding that crosses disciplines, particularly in the biological and physical sciences. The Alliance will support training and career development initiatives to establish integrated teams of cancer researchers. The Alliance will provide this training support through existing and new mechanisms. For example, the Alliance will provide training funds through the NIH National Research Service Awards for Senior Fellows and the NIH National Research Service Awards for Postdoctoral Fellows. In addition, in September 2005, through the NCI's collaboration with the National Science Foundation (NSF), \$12.8 million in new grants were awarded to four institutions over the next 5 years for U.S. science and engineering doctoral students to focus on interdisciplinary nanoscience and technology research with applications to cancer ([see NCI-NSF press release, September 21, 2005](#)).

4. Why is the National Cancer Institute making the Centers of Cancer Nanotechnology Excellence awards?

In making the Centers of Cancer Nanotechnology Excellence awards, the NCI is recognizing the scientific merit and clinical promise of the research projects, as well as the strength of the multidisciplinary teams, which include researchers from the public and private sectors that have come together to participate in these Alliance programs. These highly integrated centers will engage in directed, product-focused research that will aim to translate cutting-edge science and technology into the next generation of diagnostic and therapeutic tools that will ultimately benefit cancer patients.

Nanotechnology represents a wide range of scientific endeavors and tools, and the CCNE awards reflect that broad cross-section of technologies and disciplines being applied by

teams distributed geographically across the United States, with applications across the entire spectrum of cancers and cancer patients. The selected CCNEs will engage in a range of near-term projects that are approaching clinical use, as well as cutting-edge projects that will have an exceptionally significant impact on clinical oncology if they are brought to fruition.

5. What are the goals of the Centers of Cancer Nanotechnology Excellence?

As hubs of the Alliance, the goals of the CCNEs are to design and test nanomaterials and nanodevices and to translate their use into clinical research, resulting ultimately in the introduction of new diagnostic tools and techniques to combat the spread of cancer in the human body. The CCNEs will bridge gaps in the development pipeline from materials discovery to testing in clinical trials.

By balancing structured directives with investigator-initiated research, these centers will bring together the interdisciplinary teams from existing NCI resources and provide the infrastructure necessary to develop and translate nanotechnology advances to clinics and ultimately to cancer patients.

6. How do the Centers of Cancer Nanotechnology Excellence fit into the NCI's Challenge Goal to eliminate suffering and death due to cancer?

The newly established CCNEs will serve as hubs of the NCI Alliance for Nanotechnology in Cancer to develop and apply nanotechnology and nanoscience solutions to the diagnosis and treatment of cancer.

The CCNE network will focus unswervingly on the technology development necessary to accelerate the pace of product approval, commercialization, and delivery to cancer patients. Each of the seven CCNEs is linked to a regional, NCI-funded Comprehensive Cancer Center and one or more Specialized Programs of Research Excellence (SPORes).

In addition, each of the seven CCNEs includes biomedical researchers and investigators from engineering and physical science departments. All seven CCNEs also have advanced biocomputing capabilities and have forged partnerships with colleagues in the not-for-profit community and/or private sector to accelerate work related to the nanotechnologies they are working to develop.

7. What are the seven hubs that have been recognized and funded by the NCI as Centers of Cancer Nanotechnology Excellence?

The seven centers are listed below in alphabetical order. For more information on each center, [click here](#).

- **Carolina Center of Cancer Nanotechnology Excellence, University of North Carolina**, Chapel Hill, North Carolina. This center will focus on the fabrication of “smart nanoparticles” and other nanodevices for cancer therapy and imaging. Principal investigator: Rudolph Juliano, Ph.D. (University of North Carolina)
- **Center of Nanotechnology for Treatment, Understanding, and Monitoring of Cancer, University of California**, San Diego, California. This center will focus on a “smart” multifunctional “all-in-one” platform capable of targeting tumors and delivering payloads of therapeutics. Principal investigator: Sadik Esener, Ph.D. (UCSD)
- **Emory-Georgia Tech Nanotechnology Center for Personalized and Predictive Oncology**, Atlanta, Georgia. This center will aim to innovate and accelerate the development of nanoparticles attached to biological molecules for cancer molecular imaging, molecular profiling, and personalized therapy. Principal investigators: Shuming Nie, Ph.D., and Jonathan Simons, M.D. (Emory University and Georgia Institute of Technology)
- **MIT-Harvard Center of Cancer Nanotechnology Excellence**, Cambridge, Massachusetts. This center will focus on diversified nanoplatfoms for targeted therapy, diagnostics, noninvasive imaging, and molecular sensing. Principal investigators: Robert Langer, Ph.D. (MIT), and Ralph Weissleder, M.D., Ph.D. (Harvard University, Massachusetts General Hospital)
- **Nanomaterials for Cancer Diagnostics and Therapeutics, Northwestern University**, Evanston, Illinois. This center plans to design and test nanomaterials and nanodevices to improve cancer prevention, detection, diagnosis, and treatment. Principal investigator: Chad Mirkin, Ph.D. (Northwestern University)
- **Nanosystems Biology Cancer Center, California Institute of Technology**, Pasadena, California. This center will focus on the development and validation of tools for early detection and stratification of cancer through rapid and quantitative measurement of panels of serum and tissue-based biomarkers. Principal investigator: James Heath, Ph.D. (California Institute of Technology)
- **The Siteman Center of Cancer Nanotechnology Excellence at Washington University**, St. Louis, Missouri. This center has a comprehensive set of projects for the development of nanoparticles for *in vivo* imaging and drug delivery, with special emphasis on translational medicine. Principal investigator: Samuel Wickline, M.D. (Washington University)

8. Have nanotechnology efforts in cancer advanced since last year when the NCI announced the launch of the Alliance for Nanotechnology in Cancer?

Yes. There has been a significant flow of publications in the scientific literature reporting on discoveries and advances, many of which have been highlighted and summarized at the Alliance website (<http://nano.cancer.gov/>). In addition, numerous nanotechnology-based companies have made announcements about their products in development, some of which are in or approaching human clinical testing.

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